Aviation Research
NewsWatch

Volume 5, Issue 1 **FAA's Office of Aviation Research** **February 2000**

A Very Good Year!

As it has done over the past couple of year, *Aviation Research NewsWatch* would like to provide a quick overview of some of the FAA's major accomplishments for Fiscal Year 1999. As you will see, it was a very good year for the agency as it made tremendous accomplishments in support of its mission to provide a safe, secure, and efficient global aerospace system that contributes to national security and the promotion of U.S. aerospace safety.

During the fiscal year, the agency worked with the aviation industry to update the National Airspace System (NAS) Architecture through 2015. The plan is based on the free flight operational concept in which pilots may choose the most efficient and economical routes to their destinations. The agency continued to acquire new automation systems for the NAS, installing the Host and Oceanic Computer System Replacement at its 20 air route traffic control centers (ARTCC) and three oceanic centers. The system provides information on aircraft movements throughout domestic and oceanic airspace, and is faster and more reliable than its predecessor system. The agency also deployed the Display System Replacement to eight en route centers, replacing 30-year old equipment and providing enhanced capability to display aircraft position, identification, and weather information, as well as monitor and control system equipment and support planned enhancements to the air traffic control environment.

The agency achieved a major milestone in its Free Flight Phase 1 program when the Surface Movement Advisor, which provides aircraft arrival information to airline ramp towers and operation centers, became available to airlines at Detroit Metropolitan and Philadelphia International airports. The agency made two major upgrades to its User Request Evaluation Tool (URET) at the Indianapolis and Memphis ARTCCs. URET provides controllers with automatic conflict detection, trial planning for assistance with conflict resolution or user requests, conformance monitoring of current flight trajectory, and some electronic flight data capability.

FAA and NASA researchers also continued joint efforts on air traffic management systems that will enhance the capacity and efficiency of the NAS. For example, NASA continued to work with FAA to develop some of the necessary tools to implement Free Flight Phase 1, such as the passive final approach spacing tool and the surface movement advisor.

The Safe Flight 21 program, a joint government/industry initiative designed to validate

INSIDE THIS ISSUE

the capabilities of advanced communication, navigation, and surveillance, and air traffic procedures associated with free flight, began demonstrating automatic dependent surveillance-broadcast (ADS-B) technology. In July, 25 aircraft from the Cargo Airline Association, the FAA, avionics manufacturers, universities, the U.S. Navy, and NASA participated in a flight demonstration to begin testing ADS-B.

UPS Aviation Technologies, Inc., a subsidiary of United Parcel Service, demonstrated its proposed avionics equipment in Bethel, Alaska. As a result of that test, the FAA awarded a $3.9 million contract to UPS Aviation Technologies, for state-of-the-art avionics systems, installation kits, terrain data bases, ground-based transceivers, an avionics training simulator, and training assistance.

The FAA continued progress toward implementation of the Wide Area Augmentation System (WAAS) that will provide the availability, integrity, and accuracy for the global positioning system to be used for en route navigation and precision civilian navigation. The agency completed a series of Category I precision approach and landing test flights at Iceland's Keflavik Airport, using signals from both the FAA's WAAS testbed and the United Kingdom's Northern European Satellite Test Bed.

The FAA leased three ground reference stations and a master station to the Chilean government for flight testing satellite navigation in Chile. The Chilean government outfitted an aircraft with a GPS receiver to fly precision and non-precision Category 1 instrument flight rule (IFR) conditions at the Arturo Merino Benitez International Airport in Santiago. With support from the Civil Aviation Authority of Singapore, the FAA also installed and tested a WAAS test reference station at Singapore Changi Airport.

The FAA developed and installed in all FAA, DoD, and National Weather Service NEXRAD weather radars an advanced algorithm that detects tornadoes early in their development and shows where they will move. The agency installed the prototype Integrated Terminal Weather System, a convective growth and decay forecast product, which not only predicts thunderstorm movement based on the storm's track, but also includes the effects of storm growth and decay, at the Orlando TRACON.

The FAA transferred to industry its Weather Support to Deicing Decision Making (WSDDM) system, a stand-alone integrated display system, developed in response to the industry's need for accurate, local weather data to plan and conduct airport deicing operations, and began using the system at New York's LaGuardia Airport. WSDDM uses Doppler radar, surface weather station data, and snow gauges located at and near the airport to determine precipitation type, temperature, wind speed and direction, and the liquid water equivalent of snow.

The FAA released an up-graded version of the Integrated Noise Model (INM 6.0). INM is the FAA's standard tool for assessing aircraft noise in the vicinity of airports and is the most widely used model of its kind in the world. The FAA and NASA continued research activities under the Atmospheric Effects of Aviation Project (AEAP). The scientific findings from the AEAP served as a significant input to the *Special Report on Aviation and the Global Atmosphere* published by the Intergovernmental Panel on Climate Change. The report indicates that the growing demand for air transportation services may cause aviation's current small contribution to climate change to increase substantially in the future. Scientific understanding of the effects of carbon dioxide is good, while only fair to very poor for the effects of other aircraft emissions on ozone and cloudiness. The report is being used as a basis for policy recommendation by the International Civil Aviation Organization. The two agencies also completed research activities under the Advanced Subsonic Technology Program to develop combustor technology to reduce aircraft engine exhaust emissions.

During the fiscal year, the FAA and NASA expanded integrated efforts to reduce the fatal commercial accident rate. Researchers are working together to better understand and develop technologies to mitigate the effects of phenomena such as windshear and inflight icing, and to prevent

accidents by finding the means to detect potential structural problems in the nation's aging airline fleet.

As part of its safety efforts, the FAA continued advanced research activities in a number of critical aviation safety areas. Researchers developed new stringent fire test criteria for aircraft thermal acoustical insulation aimed at preventing in-flight fires originating in hidden areas of the aircraft. The Aging Non-Structural Systems Research Program formally got underway in FY 1999 to develop a test and validation infrastructure, develop wire testing equipment, assess visual inspection procedures, and develop aircraft arc fault circuit breakers.

The agency completed construction of the Full-Scale Aircraft Structural Test Evaluation and Research Facility, which is being used to test fuselage panel specimens under conditions representative of those seen by an aircraft in actual operation.

In addition, the agency released a software code called "Design Assessment of Reliability with Inspection (DARWIN)" that will improve the structural integrity of turbine engine rotor disks used in commercial aircraft engines by assessing rotor design and life management. The FAA and the Helicopter Association International developed and released a web-based Maintenance Malfunction Information Reporting system, which allows helicopter operators and repair stations to fulfill FAA service difficulty reporting requirements and create manufacturer warranty claim forms.

Researchers at the FAA's Airworthiness Assurance Center of Excellence completed a first generation PC-version of XRSIM, which simulates radiographic (X-ray) inspection of aircraft components, and is used during the development of inspection procedures to optimize radio-graphic inspections. The agency also developed the web-based Air Personnel Module of Safety Performance Analysis System, which expedites the Aviation Safety Inspector's activities in the areas of certification, recerti-fication, surveillance, and investigation by providing readily accessible information from a variety of data sources and highlighting important information. The agency also certified AlliedSignal TCAS II Version 7, incorporating more than 300 detailed modifications to the surveillance and collision avoidance algorithms and displays in TCAS II avionics equipment.

To learn more about the occurrences and characteristics of freezing drizzle aloft, FAA researchers are developing a centralized database of fine scale measurements in these kinds of icing conditions. The agency also sponsored the development of a prototype aircraft mounted wide area ice detection system, which is now installed in the FAA Technical Center's B-727 ground test vehicle for preliminary tests.

In May 1999, an American Eagle commuter aircraft landed long on runway 4R at John F. Kennedy International Airport and stopped 250 feet into a cellular cement arrestor bed, a passive aircraft arrestor system developed and tested by the FAA, the Port Authority of New York and New Jersey, and Engineered Systems Company. All 30 people on board escaped injury and the aircraft experienced only minor damage.

In April, the FAA dedicated its new National Airport Pavement Test Facility, designed to provide high quality, accelerated test data from rigid and flexible pavements subjected to simulated aircraft traffic, and in September conducted, with Boeing, the first set of full-scale pavement tests at the facility.

In FY 1999, the FAA developed and initiated an extensive research and development program in the area of wildlife strike mitigation and completed a wildlife control manual, which offers practical solutions to problems of habitat modification and wildlife management (see page 5). The agency, in conjunction with the Port Authority of New York and New Jersey, completed a study investigating the effect of tall grass on bird activity at John F. Kennedy International Airport, and continued to expand the National Wildlife Strike Database, which lists and details wildlife strike reports.

Human factors research continued to increase the safety and efficiency of the NAS by developing guidance for improving the performance of air carrier crews, general aviation

pilots, aviation maintenance personnel, air traffic controllers, and NAS system maintenance technicians. Aviation medicine research proceeded with efforts to improve the health, safety, and survivability of aircraft passengers through development of recommendations for counteracting human failure conditions.

Human factors practitioners also developed a new training methodology that allows air carriers to present unique training and assessment experiences for each flight crew, greatly enhanc-ing training and assessment capabilities and benefits. FAA, in collaboration with NASA, produced a manual for developing operating documents that provides guidelines on the organization and design of checklists, quick reference handbooks, and guides used on the flight deck. Researchers also developed guidelines on maintenance resource and error management.

The human factors research program completed a human-in-the-loop high fidelity simulation to investigate controller performance and workload
impacts resulting from airspace boundary adjustments. Research began on a Congressionally-directed survey focused on the effects of shiftwork scheduling practices and fatigue in the ATS workforce. The human factors program continued its support of the National Institute for Occupational Safety and Health Cabin Air Quality Study ordered by Congress. In addition, researchers developed an analytical technique that employs DNA probes to differentiate blood alcohol intake before death from alcohol produced by the body through natural processes after death. This will prevent incorrect conclusions from accident investigations.

The agency continued its research and development activities to prevent explosives, weapons, and other threat materials from being introduced on aircraft. To detect weapons in checked luggage, the FAA worked with industry to certify two new explosives detection systems, the L3 eXaminer 3DX6000 and the InVision CTX9000. Agency researchers synthesized and characterized a new terrorist explosive, Triacetone Triperoxide (TATP), which recently appeared as a weapon of mass destruction in the Middle East, and adapted the current generation of explosives trace detection systems to detect TATP.

The agency also established an explosives standard system (Trace Personnel Standard - Dry Transfer Method), enabling the evaluation of emerging explosives trace detec9tion technology. In addition, the FAA completed the screener selection test assessment and fielded six perceptual and cognitive tests at 18 major U.S. airports to develop a screener aptitude test to predict future performance of checkpoint security screener candidates. The FAA provided over 250 copies of the BlastFX software tool to government agencies. BlastFX is a self-contained software package that can be used to model and analyze the effects of a blast on facilities (see the website: www.blastfx.com).

The agency also conducted two Radio Frequency Identification (RFID) Baggage Tag trials, in conjunction with United and Continental Airlines. The tests provided critical operational performance information to support airline efforts to develop an international standard for RFID Baggage Tag use.

FAA's Office of Commercial Space Transportation licensed two successful launches by Sea Launch during the fiscal year. These were the first licensed launches without any involvement from a Federal launch range. Overall, there were 18 launches during the fiscal year that were FAA licensed as commercial, although two were failures.

The agency issued a launch operator license to Orbital Sciences Corporation for the first commercial launches from Kwajalein Missile Range, operated by the U.S. Army, in the Marshall Islands, Pacific Ocean, and renewed five launch operator licenses. FAA and NASA signed a Memorandum of Understanding Concerning Future Space Transportation Systems, which describes the FAA/NASA cooperative activities that will be conducted under the category of

future space transportation systems and reusable launch vehicle (RLV) technology, research and development. The agency and its Commercial Space Transportation Advisory Committee released the 1999 Commercial Space Transportation Forecasts, which projects an average of 51 commercial space launches per year through 2010, an increase of over 40 percent from the 36 commercial launches conducted worldwide in 1998.

In addition, the agency issued final rules on Financial Responsibility Requirements for Licensed Launch Activities and Commercial Transportation Licensing Regulation. It also issued notices of proposed rulemaking on Commercial Space Transportation Reusable Launch Vehicle and Reentry Licensing Regulation, Licensing and Safety Requirements for Operation of a Launch Site, and Financial Responsibility Requirements for Licensed Reentry Activities. In addition, the FAA published a Draft Programmatic Environmental Impact Statement for Commercial Launch Vehicle Programs as part of its responsibility under the National Environmental Policy Act.

Protecting Airports

The presence of wildlife on and near airports creates a hazard to aircraft. It is estimated that 75 percent of all civil aviation airstrikes occur near airports. Wildlife strikes, mainly from birds, cause severe damage to operating aircraft and in some cases lead to loss of life. In recent years the probability of wildlife strikes has increased dramatically because of increases in passenger traffic, the intro-duction of much quieter engines on newer planes, and a large increase in wildlife population.

On January 10, in a joint effort to address wildlife hazard management at airports, FAA's Office of Airports and the U.S. Department of Agriculture's (USDA) Wildlife Services issued a manual to help airport sponsors combat wildlife hazards at airports. The manual, the first of its kind in the United States, is the culmination of years of research, airport site visits, and training conducted by the two agencies. The manual contains information designed to assist airport personnel in addressing: wildlife hazards at airports; agencies/ organizations impacted by hazards; Federal regulations addressing hazards; requirements for wildlife hazard assessments/ management plans; methods to reduce hazards; wildlife control programs; and wildlife hazard management training for airport employees.

Researchers in the Airport Technology Research Branch (AAR-410) at the Tech Center accomplished the work that laid the basis for this manual. Under the direction of **Dr. Michel Hovan**, the FAA has an aggressive research program to mitigate wildlife strikes with aircraft by providing practical solutions as well as real-time critical information to pilots and airport managers.

The research work can be categorized into the following areas:

- **Habitat Studies** – to understand the habitat of problem species such as black birds, birds of prey, rodents and large mammals.
- **Detection Methods** – to provide the airport community with a set of tools to detect wildlife at critical times of the year.
- **Wildlife Management Techniques** – to provide the airport community with a set of passive and active methods to manage wildlife at airports.
- **Systems Integration** – to understand and predict the potential for wildlife strikes at an airport level using information collected at the regional and national level (such as migratory paths).

Copies of the new manual can be obtained from the FAA's wildlife hazard website at:

www.faa.gov/apr/hazard.htm or by writing to: New Orders, Superintendent of Documents, P. O. Box 371954, Pittsburgh, PA 15270-7954.

New Public-Private Partnership to Improve Aviation Safety

On January 14, President Clinton unveiled the Aviation Safety Action Program (ASAP), a new public-private partnership to boost aviation safety and protect the millions of Americans who travel by air every year. The partnership, which brings together the FAA, airlines, and employee unions, will encourage better reporting of safety concerns by aviation employees to their employers.

ASAP will give the FAA and airlines an important new source of information to prevent safety incidents and will help meet the Administration's goal of reducing commercial aviation accidents by 80 percent by 2007.

ASAP has three important features: (1) new sources of safety data, (2) new incentives to report safety problems; and (3) the ability to reduce accidents and track problem areas.

- **New Data Sources**: Improving air safety depends heavily on the ability to collect and analyze safety data, and to use that information to develop safer systems and take corrective actions before accidents occur. Airline employees are sometimes reluctant to report data that might result in the FAA undertaking enforcement action. As a result, important information goes unreported. The ASAP program will provide an important, previously unavailable source of data that will allow information to be captured rapidly and directly from those responsible for the day-to-day safe operation of our aviation system.
- **Incentives to Report Safety Issues**: The ASAP program provides incentives to encourage aviation employees to swiftly report safety problems. It protects employees who promptly report problems, while at the same time retaining the FAA's ability to vigorously prosecute cases involving substance or alcohol abuse, or intentional falsification by aviation employees, and to refer cases of potential criminal activity for prosecution by the Department of Justice. It also preserves the FAA's ability to take enforcement action in cases where FAA safety inspectors independently become aware of a potential violation.
- **Reducing Accidents and Tracking Problems**: The ASAP program will help meet the Administration's goal of an 80 percent reduction in the commercial aviation accident rate by 2007. It will do so by providing a better look at human performance errors, helping improve man-machine interactions, and making it easier to put user-friendly technology in the cockpit and control towers. It can also lead to better aircraft operating and maintenance procedures, better equipment design, and improved pilot and mechanic training programs.

AAR Employee Corner

Charlie Huettner (AAR-2A) has accepted a detail appointment to the Executive Office of the President, Office of Science Technology Policy (OSTP), where he will be serving as a senior policy advisor for aviation. In that position, he will be responsible for interagency coordination and implementation of the Administration's policies and programs related to aeronautics R&D; aviation safety, security, efficiency and environment; and GPS. You can reach Charlie by phone at (202) 456-6034, fax at (202) 456-6023, or by email at chuettne@ostp.eop.gov.

Terry Kraus (AAR-4) has accepted a 9 month detail assignment as a policy analyst in the Office of Civil Aviation Plan

and Policy (ACP-8). You will still be able to reach her at (202) 267-3854.

Recently, **Herm Rediess** (AAR-1) and **Hugh McLaurin** (acting AAR-2) "mugged" a few AAR employees for a job well done. Each honoree received a certificate of appreciation and an AAR coffee mug. Those recognized included:

- **Lois Conrader** (AAR-10) for her "ability to identify needs, select the optimum response, and follow-through to delivery, ensuring organizational needs are always met in a timely manner."

- **Denise Davis** (AAR-200) for her "tireless work in support of the Office of Aviation Research, and for your annual efforts on behalf of the Salvation Army's Angel Tree Program."

- **Dave Smith** (AAR-200) **f**or his energy and dedication in overseeing preparation of the Fiscal Year 2000 National Aviation Research Plan, and his commitment in ensuring its on-time delivery to Congress.

- **Carolyn Williams** (AAR-100) for her "tireless work in support of the Office of Aviation Research" and because of her "cheerful dedication in ensuring that vital deadlines are met and that your high tempo office runs smoothly, AAR-100 remains efficient and productive in satisfying critical human factors research requirements."

- **Chuck Overbey** (AAR-100) for his "pivotal work on the IPLT Human Factors Subteam in bringing the FAA and bargaining units together to craft a plan for integrating human factors into system acquisition."

On February 23, Herm and Hugh traveled to the Tech Center to "mug" AAR employees there. Those recognized for a job well done included:

- **Rich Lyon** (AAR-422) in recognition of his November 9, 1999, patent award for a Microscale Combustion Calorimeter. The calorimeter requires only milligram samples to measure the heat release rate of cabin materials during flaming combustion. This device provides valuable data to polymer scientists developing ultra fire-resistant materials because they can synthesize only minute quantities of new polymers, at great cost, during the initial stages of their research.

- **Bill Cavage, Jr.** (AAR-422) for his valuable contributions to recent FAA research related to fuel tank explosion protection. He headed a study to compute the entire costs associated with a ground-based fuel tank inerting system. He also conducted tests on a prototype fuel tank inerting system, employing hollow fiber gas separation membrane technology, which is believed by many to be the most promising technology for this application. It is noteworthy that Bill has been a full-time federal employee for less than one year.

- **Paul Boris** (AAR-421) for the work he has done in support of establishing a standard for laboratory qualification/ determination of holdover times for deicing fluids. This work represents a significant international effort involving many of the world's airlines, fluid manufacturers, testing laboratories, aircraft manufacturers, atmospheric research organizations, and regulatory authorities.

- **Gerald Walter** (AAR-432) in appreciation of his out-standing efforts in obtaining hundreds of jet fuel samples from various air carriers at Philadelphia, JFK, and Newark airports, transporting them back to the Technical Center, and then performing analyses of properties of these fuel samples.

- **Dy Le** (AAR-431) for his outstanding efforts in working with academia, industry, and other government agencies to develop a technology roadmap

for a critical need of the FAA Southwest Region, the sponsor. The roadmap identifies critical technology requirements for implementing damage tolerance in rotorcraft industry.

- **Chris Smith** (AAR-433) for his outstanding leadership of the new research area of Aging of Nonstructural Systems in drafting two new research project descriptions, developing a program area plan, and working closely with the Northwest Mountain Region, the sponsor.

- **Thomas Flournoy** (AAR-430) for his outstanding efforts in organizing and serving as chairperson for the 3rd Joint FAA/DoD/NASA Conference on Aging Aircraft. The conference, held in September 1999, was extremely successful with over 640 participants.

- **Jason Reap** (AAR-540) for his dedication and willingness to volunteer to be at the Technical Center over New Years 2000. He was one of our "Day One Team" working on the biggest New Year celebration in history.

- **Tama Nelson** (AAR-540) for her secretarial support for the past few months. She has done a terrific job as Branch and acting Division Secretary, eagerly accepting additional work without complaint and has volunteered to fill in when others were not available. She set up a branch office from scratch, is always pleasant, and supports the goals and objectives of the FAA and the Model Working Environment program by participating in team meetings.

- **Ray Schillinger** (AAR-530) for the outstanding work he has done on the MANPADS Program. This Program looks at the threat to civil aviation from Manually-operated Portable Air Defense Systems (weapons that could shoot down a plane from the ground). He has conducted several field tests and assessments of various types of hardware, both foreign and domestic, and has written several reports on his findings. His ability to work closely with his counterparts in the Defense Department demonstrates how valuable an asset he is to the Aircraft Hardening Program and to Civil Aviation Security in general.

- **Mike Snyder** (AAR-510) for his work as the lead for execution of the directed Trace laboratory study. The results of the test will provide critical data to ACS necessary to determine the efficacy of directed trace as an alternative to EDS.

- **Mike Barrientos** (AAR-510) for his work as the lead for development and execution of the test of Threat Image Protection x-ray (TRX) equipment. Mike's team evaluated the TRX equipment against stated functional requirements. This data directly supports an acquisition and deployment decision of the SEIPT in meeting FAA deployment goals.

- **Rick Lazarick** (AAR-510) for his work leading the Vulnerability Assessment project supporting ACS operations. Rick's work was critical to establishing a standardized assessment tool that can be used by domestic airports to perform vulnerability assessments.

- **Patti Ireland-Long** (AAR-510) for her excellent support to the division in its time of limited secretarial support. During this time she helped train 4 new secretaries, while still accomplishing the work in her own branch.

- **Buzz Cerino** (AAR-510) for leading AAR-500's Y2K work. He also served as one of the volunteers who worked at the Technical Center over New Years 2000.

- **John Tye** (AAR-540) for his work in ensuring AAR-500 had the unique resources to conduct a high profile "pop up" test to generate data on the value of using "Directed Trace" for explosives detection. He rapidly canvassed resources within the

AAR-100 Human Factors Training is Supporting Acquisition Programs

The FY 2000 ARA Performance Plan Goal 2 (Human Factors) proposes to "ensure human factors policies, processes, and best practices are integrated in the research and acquisition of 100% of FAA aviation systems and applications." Among the many elements of the strategies for achieving this goal is a plan to conduct human factors training to support these acquisition programs. Efforts are underway to do just that.

Background

Under the Acquisition Management System, the Integrated Product Teams (IPT) are empowered, cross-functional teams that have the responsibility for delivering a product or service that meets the needs of their customer. The application of human factors to acquisition programs helps ensure that the system design is human-centered, meets program goals and objectives, reduces risk, lowers life-cycle costs, and achieves a higher probability of program success. Human factors training support to IPTs (and product teams/program offices) ensures that human factors best practices are employed, so as to arrive at an acquisition solution that provides the most effective use of human capabilities and minimizes the effects of human limitations and errors on the eventual performance of the system.

The essential human factors training entails both generic or cross-cutting human factors technical information as well as instruction that varies by program and considers the differences among the systems, the acquisition strategy, the phase of development, interaction and integration with other systems, and the level and type of human involvement. Training associated with the human factors integration activities meets these multiple objectives by addressing three basic types of training:

Awareness Training

This training consists of instruction that is focused on providing basic information about human factors in general. Areas addressed may include such topics as the definition and scope of human factors; demonstrations and illustrations of human factors concepts, principles, conventions; generic and common approaches to human factors engineering in acquisition and other environments; standard practices and lessons learned; and common problems in human factors application.

For example, in a 2-day course sponsored by AAR-100 and developed and presented by the University of Central Florida, generic information about the human factors engineering discipline provides a basic understanding of the scope of human factors considerations and of the importance for considering the "human factor" in the design and development of complex operating systems. This course has been conducted several times both in the Washington, D.C., area and at the William J. Hughes Technical Center. Other training included in this category are courses such as:

- FAA Acquisition Management Training (Human Factors Module)
- iCMM Human Factors Awareness Training
- Life-cycle Acquisition Training Forum/Seminar
- Human Factors Laboratory and Prototyping Demo

Specialized Technical Training

This training consists of instruction that is focused on technical areas of human factors that may be of specific or general interest to the ARA or FAA population. It provides information that is relevant to the application of human factors in a variety of environments. Dr. Kim Cardosi and Dan Hannon of the Department of Transportation Research and Special Programs Administration's Volpe National Transportation System Center, recently conducted a workshop on the "Use of Color in Modern Information Displays" that offers a good example. During this two-hour workshop on color, Kim and Dan provided information and guidance on how to use and how not to use color in ATC and airway facilities displays. The workshop also covered: a) an introduction to "color science" (how color is produced on displays and perceived by users), b) factors that affect color appearance, c) what we know (and don't know) about

how color should be used on a display, and d) guidelines for the use of color on displays. Other areas addressed by specialized technical training include such topics as:

- Designing Computer-Human Interface (CHI) and CHI prototyping techniques
- Warnings, Alerts, and Alarms
- Anthropomorphics in system design
- Survey and questionnaire design
- Environmental considerations in system design
- Information coding
- Design for maintainability
- CHI Guidelines, Standards, and Styles

Tailored Program Training

This training consists of instruction that focuses on an Integrated Product Team, acquisition program office, or acquisition system. It provides information that is specifically relevant to the program or system being acquired and addresses risks or opportunities that may be peculiar to the systems or program. This training is intended to answer the specific needs of an IPT or product team, or some other group. The training program may include specific application topics or general discussions in such areas as:

- Human Factors in Integrated Requirement Team Activities
- Human Factors in Investment Analysis Team Activities
- iCMM Human Factors Process Integration and Execution
- Exit Criteria for Human Performance Issues
- Human Factors in Test and Evaluation

The implementation of this training program integrates the diverse elements of general human factors training, specific technical human factors training, iCMM human factors implementation, as well as the important Goal 2 human factors assessments and mitigation planning needed to identify and prioritize human factors risks. To lessen these risks, perhaps your team, too, could benefit from an increased understanding of what human factors engineering is all about. For information, call **Glen Hewitt** (AAR-100) at (202) 267-7163.

Happy Birthday AAR

On February 1, **Herm Rediess** sent out the following message to AAR employees:

"February 1, 2000, is a significant date in AAR history. Did you know that today is our 5th birthday?

Five years ago in a memo welcoming his new employees, **Dres Zellweger** pointed out that 'as AAR, we are a significant part of the new Aviation Research and Acquisitions, or ARA, organization. I'm pleased with the new structure and the constructive opportunities it will allow us.'

We've come a long way since then, and I want to be the first to wish everyone Happy Birthday!

. . . I also want to let you know how much I enjoy working with you. I am proud of AAR's energy and dedication to ensuring the safety, security, and efficiency of the NAS. There is no other office in the government that I would rather work in. Thank you for always making the agency look good."

Hugh McLaurin (acting AAR-2) also extended his congratulations to all AARers. "Although I am fairly new to the organization, I have worked closely with AAR since its inception, and I too am impressed by the teamwork and accomplishments of this organization. It is amazing to think about all of the enhancements to safety, security, and efficiency that AAR has accomplished in a short 5 years. I am proud to be part of this team."

Jan Brecht-Clark (currently detailed as ACP-1) recalled "as a new organization, we were full of expectations and ambition. I am happy to see that 5 years later, AAR has more than met all expectations and has become one of FAA's most productive offices."

Human Factors Guide for Air Traffic Controllers

In an effort to bring the results of human factors research to air traffic controllers in a format that is straightforward and easy to read, the Federal Aviation Administration (FAA) has released "Human Factors for Air Traffic Control Specialists: A User's Manual for Your Brain."

The 46-page booklet is divided into 5 easy-to-read and well-illustrated chapters designed to provide quick tips on how to enhance the factors that contribute to or influence controller performance:

1. An Elephant Might Never Forget, but We're Not That Lucky: How to Make the Most of the Memory You Have

2. Controller-Pilot Communications: How to Talk to Pilots so They'll Hear What You Want Them to Hear

3. Know Your Limitations: How to Recognize Common Threats to Performance

4. Fatigue Busters: Tips for Sleeping Better and Maintaining Alertness on the Job

5. Did You Know That . . . ? Tips for Maintaining Your Hearing and Sight

"This is a marvelous tool for controllers," says Steve Zaidman, FAA's Associate Administrator for Research and Acquisitions. "It not only provides ideas on how to enhance performance, but explains why such changes may improve safety in the national airspace system."

For example, in a study of incident reports submitted by pilots and controllers, multiple instructions given in the same air traffic control transmission were associated with 49 percent of altitude deviations and 48 percent of the potential altitude deviations. To help prevent miscommunications between controllers and pilots, the guide recommends "that whenever possible, controllers should give pilots no more than 3 pieces of information in a single transmission." This is important because the complexity of the controller's transmission has a direct effect on the pilot's ability to remember it.

Sponsored by the FAA's Office of the Chief Scientific and Technical Advisor for Human Factors, the guidebook was a collaborative effort of the Department of Transportation Research and Special Programs Administration's Volpe National Transportation System Center, the FAA's William J. Hughes Technical Center and Civil Aeromedical Institute, and the National Air Traffic Controllers Association.

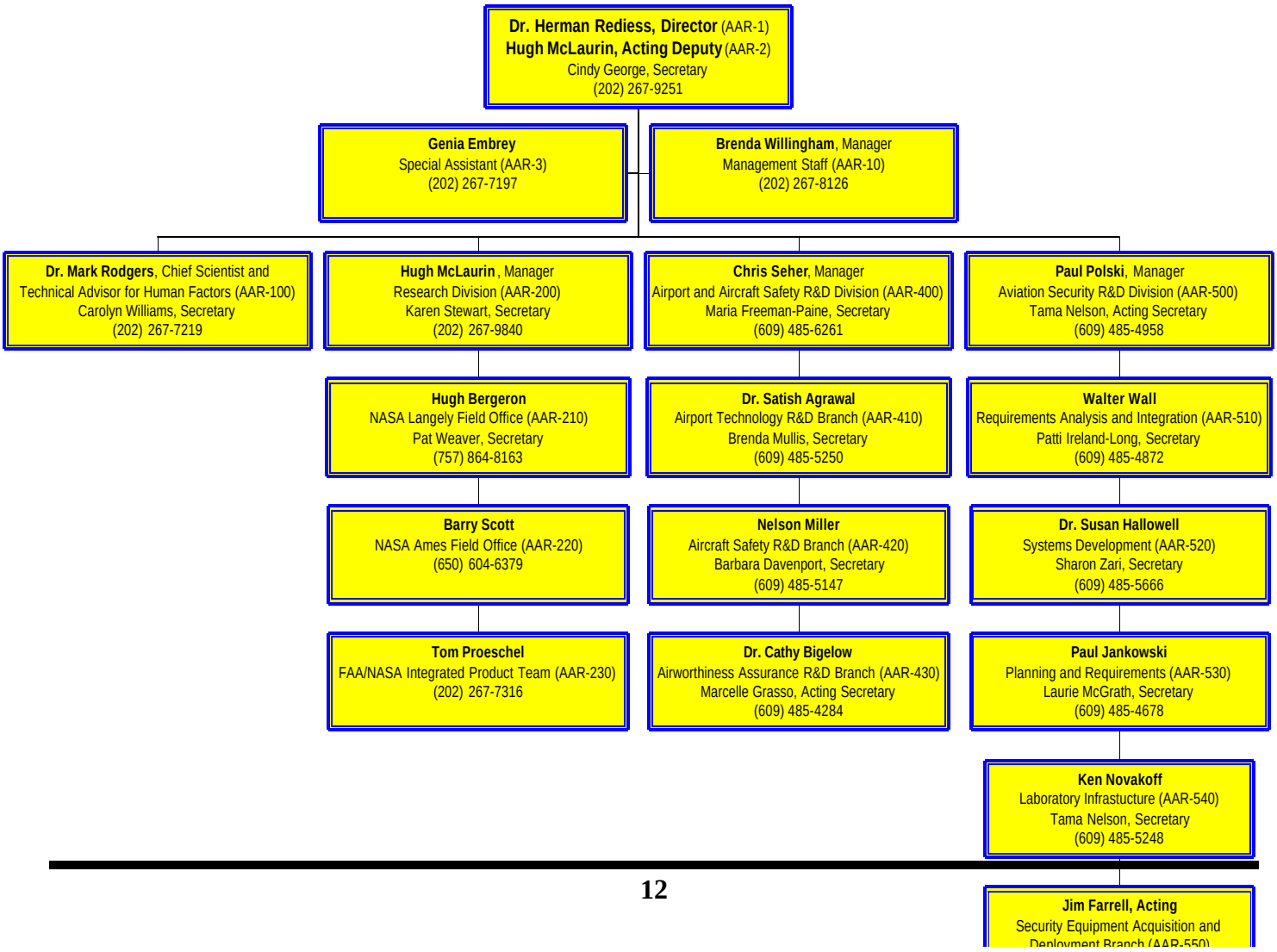
The document (DOT/FAA/AR-99/39) is available to the public through the National Technical Information Service, Springfield, VA 22161, or by contacting Kim Cardosi at cardosi@volpe.dot.gov.

SEIPT Organizational Changes

Effective January 30, AAR and the Office of Civil Aviation Security (ACS) made the following changes to the Security Equipment Integrated Product Team (SEIPT). The SEIPT Lead now reports directly to the Office of Civil Aviation Security Policy and Planning, and the Associate Administrator for Civil Aviation Security has responsibility for the SEIPT programmatic and technical direction, and aviation community and Congressional issues. The SEIPT's acquisition authority, however, remains with the agency's Acquisition Executive (ARA-1).

In addition, with the exception of the IPT Lead, AAR-600 has become a branch, AAR-550, under the Aviation Security R&D Division, the Security Equipment Acquisition and Deployment Branch. The IPT Deputy Lead, Jim Farrell, serves as the acting manager of AAR-550. The SEIPT will remain in Herndon, VA. They can be reached at (703) 707-5637.

AAR Organization Chart



Human Factors Support Certification of Screening Companies

A recently released FAA Notice of Proposed Rulemaking (NPRM) proposes to require all companies that perform aviation security screening to be certified by the FAA and to meet enhanced requirements. Many of these requirements are predicated on the ongoing human factors research that has been conducted at the technical center by the Aviation Security Human Factors Program (AAR-510).

The NPRM is in direct response to recommendations by the White House Commission on Aviation Safety and Security and to a Congressional mandate in the Federal Aviation Reauthorization Act of 1996. This act, signed by the President as public law 104-264, specifically states:

> The Administrator of the Federal Aviation Administration is directed to certify companies providing security screening and to improve the training and testing of security screeners through development of uniform performance standards for providing security screening services.

This approach represents a greater emphasis on the role of security screening companies and their employees in the civil aviation security system.

A brief review of the current approach to security screening in the United States is offered to provide a context for the anticipated changes that will result from the screening company certification rule. Currently, the Administrator is required to prescribe regulations to protect passengers and property on aircraft against acts of criminal violence or aircraft piracy. The protections include searches of people and property that will be carried aboard aircraft to ensure that they have no dangerous weapons, explosives, or other destructive substances (49 U.S.C. 44901-44903).

These screening operations are prescribed in rules in Part 108 of Title 14 of the Code of Federal Regulations, which contains specific rules for air carrier screening operations. These rules are further delineated in a nonpublic security program, the Air Carrier Standard Security Program (ACSSP), between the FAA and the air carrier. Overall, there are several means by which a carrier can conduct screening (e.g., use its own employees, contract with a screening company, or contract with another carrier to conduct screening) and in each case the carrier is required to provide oversight to ensure that all FAA requirements are met.

The current regulatory approach focuses primarily on the role of the air carrier rather than the security screening company (note that the majority of air carriers contract out the screening function since it is not one of their core competencies). The FAA is aware of increasing threats of terrorism against civil aviation and intends to enhance further the approach that is currently used. The current approach to selecting, training, and monitoring the performance of security screening personnel is presented in Figure 1. Screeners are currently selected via unstructured interviews, generally after responding to a newspaper advertisement.

Current Paradigm

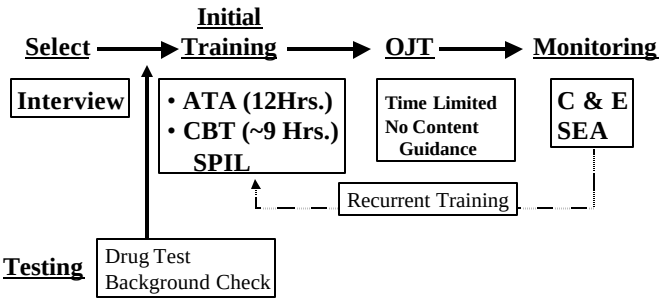


Figure 1

The applicant must pass a drug test and a background investigation before beginning initial screener training. In most instances, this training is 12 hours of classroom instruction based upon a FAA-approved Air Transport Association (ATA) syllabus. After completion of a paper-and-pencil test, the trainee spends a period of time in on-the-job (OJT) at the checkpoint during which there is no independent judgement for screening passengers or belongings. After a period of time under supervision the

trainee becomes a full-fledged screener and commences duties at the checkpoint. To monitor performance, undercover field agents conduct ongoing tests. This undercover compliance and enforcement (C&E) testing may result in fines to the air carrier and recurrent training for screening personnel. Security personnel are also required to attend recurrent every year.

The recently released NPRM will have great impact on security screening in the United States and it will directly alter the current paradigm of screener selection, training and monitoring. The NPRM has two objectives: to propose procedures for certification of screening companies, and to propose 5 other requirements to improve screening. The latter are based on results from the ongoing program of Aviation Security Human Factors Research at the Technical Center. These improvements are reflected in Figure 2, the enhanced paradigm for screener selection, training, and monitoring.

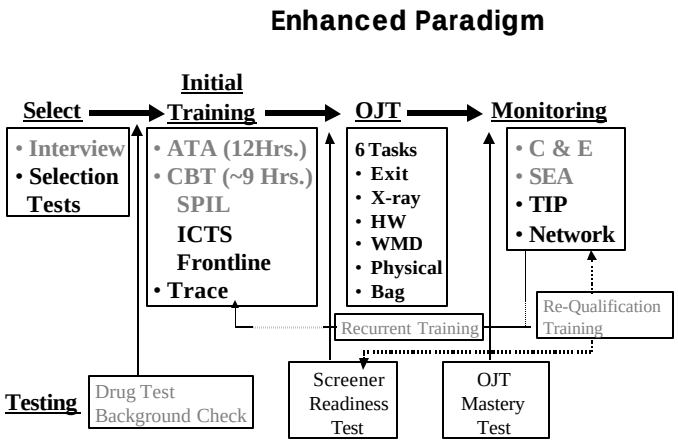


Figure 2

The proposed regulatory approach will focus jointly on the role of the air carrier and the security screening company to further enhance security. Under this new approach, screeners will be selected via interviews with input from FAA validated selection tests. The Aviation Security Human Factors Program has been working for the past several years to customize and validate computerized non-verbal test of job applicant aptitude for threat detection using X-ray equipment. The challenge has been to develop valid, reliable, non-biased, and cost-effective tests that predict screener performance. This effort will culminate in useful tools for security companies to employ in selecting qualified job candidates.

The human factors program has also been working with industry to support development of enhanced training presented via computer. The major benefits of computer-based training (CBT) are self-paced instruction, rigorous testing, standardization of presentation, and extensive practice and exposure to sophisticated threats. This ongoing effort has resulted in the availability of sophisticated CBT training programs from three independent vendors. The use of state-of-the art training approaches and technologies holds great promise to efficiently and effectively teach new screeners the critical knowledge and skills they will need at the checkpoint.

A major human factors effort this past year has been to develop an FAA-approved and controlled test that will determine screener master of initial training prior to their checkpoint apprenticeship (i.e., OJT). This Screener Readiness Test (SRT) will assess screener knowledge of security background, rules, and procedures, as well as, their proficiency at X-ray threat detection. The SRT will feature multiple choice and image interpretation questions sampled randomly from a large pool of items. Recent field testing with more than 350 screeners across the U.S. indicated that the test is reliable, valid, and non-biased. A comparable effort is underway to develop and validate a test to determine the mastery of OJT skills and abilities. It is expected that this test will permit specific qualification by piece of equipment (e.g., X-ray machines; explosive trace detectors), similar to a pilot type rating. The OJT Mastery Test will be the final hurdle prior to a screener taking a position at a security checkpoint. The combination of these two tests will be powerful tools to ensure that screeners have mastered their training and that they are fully prepared for the rigors of their job.

The final human factors component to support the certification of screening companies is enhanced performance monitoring. The Aviation Security Human Factors Program has been working for the past several years to develop and deploy Threat Image Projection

(TIP) to monitor screener performance. TIP has significant potential benefits and it is a critical component of the proposed rule. The TIP system uses two different methods of projection (i.e., fictional threat images and combined threat images) to superimpose threats into the stream of passenger baggage at a checkpoint. The Fictional Threat Image superimposes a threat image (e.g., a gun) from an extensive library of images on the X-ray image of actual passenger baggage being screened. The image appears on the monitor as if a threat object actually exists within the passenger's bag. The screener can check whether the image is an actual threat image before requesting that the bag be screener further. The Combined Threat Image is a prefabricated image of an entire threat bag and also can be electronically inserted onto a display monitor. For both types of images, screeners are immediately given feedback on their ability to detect threats. TIP exposes screeners to threats on a regular basis to train them to become more adept at detecting threats and to enhance their vigilance. TIP also allows the FAA to expose screeners to the latest potential threats and to provide valuable information about detection performance.

Overall, the robust and proactive Aviation Security Human Factors Program has been working to develop approaches and interventions to further enhance the human contribution to civil aviation security. The program continues to focus its research on the attributes, skills, and abilities that make for an effective security screener. As advanced security technologies are being fielded, the importance and dependence on the human operator has become increasingly critical. Careful consideration of human factors issues in aviation security supports the proposed certification of screening companies and the central goal of protecting the flying public from terrorist threats.

For additional information on the security human factors program, contact **Dr. Eric Neiderman** at (609) 485-4360.

RESEARCH, ENGINEEERING AND DEVELOPMENT ADVISORY COMMITTEE TO MEET

The next meeting of FAA's Research, Engineering and Development Advisory Committee (REDAC) will meet on April 11-13, 2000, at the Holiday Inn Rosslyn Westpark Hotel. For meeting information, contact Gloria Dunderman at (202) 267-8937 or via email at gloria.ctr.dunderman@faa.gov.

The REDAC, established in 1989, advises the Administrator on research and development issues and coordinates the FAA's research, engineering and development activities with industry and other government agencies. The committee considers aviation research needs in air traffic services, airport technology, aircraft safety, aviation security, human factors, and environment and energy.

A maximum of 30 members may serve on the Committee, representing corporations, universities, associations, consumers and government agencies. Members serve two-year terms. **Dr. Herman Rediess**, FAA's Director of Aviation Research, serves as the executive director of the Committee. Mr. Robert E. Doll, President of Tech/Ops International, Inc., currently serves as the Committee chairman.

For additional information on the Committee, please see their website at http://research.faa.gov/aar/redac.cfm.

Preliminary Results from the BE-1900D Operational Loads Monitoring Program

During the decade of the 1990s, there was a strong interest worldwide in using on-board data to characterize the actual loading environment experienced by aircraft in typical operations. Most attention to date has been given to large transport aircraft, although there has been some data collected for special situations and general aviation aircraft.

This article summarizes the findings of a preliminary statistical loads survey of commuter operations. The data were collected from digital flight data recorders (DFDR's) on 28 BE-1900D turboprop aircraft (Figure 1 and Table 1), representing 903 flights and approximately 585 hours of operation. Flight and ground loads data, aircraft

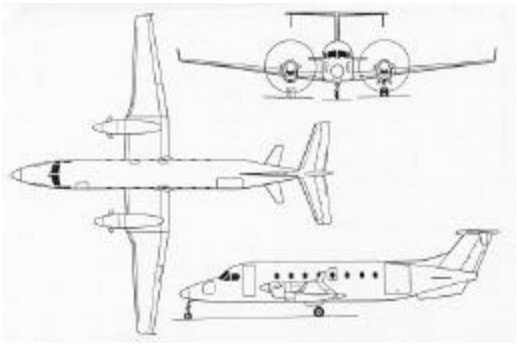


Figure 1

Table 1

Maximum Taxi Weight	17,060 lb.
Maximum Take-off Weight	16,950 lb.
Maximum Landing Weight	16,600 lb.
Zero-fuel Weight	15,000 lb.
Empty Weight	10,350 lb.
Fuel Capacity	668 U.S. gallons
2 P&W PT6A-67D Turboprops	@ 1,279 shp each
Wing Span	57 ft 11.25 in
Wing Reference Area	310 ft^2
Wing MAC	5.32 ft
Length	57 ft 10 in
Height	15 ft 6 in
Tread	17 ft 2 in
Wheel Base	23 ft 9.5 in

ground loads data, aircraft usage data, and engine data were collected and analyzed (Table 2), but only the flight loads data are presented herein. Because of the relatively small number of aircraft and flight hours and the fact that the operations were over a limited region of the United States, the load statistics may not have stabilized. However, herein is contained a short summary of the first such data collected for commuter operations in the United States. Efforts at acquiring additional flight data are continuing.

Table 2

Parameter	Units	Sample Rate
Normal Accel	g	8 per second
Long Accel	g	4 per second
Flap Position	Discrete	1 per second
Pitch Control	Degrees	2 per second
RPM L	RPM	1 per second
RPM R	RPM	1 per second
Prop. Reverse	Discrete	1 per second
Ind Airspeed	Knots	1 per second
Press Altitude	Feet	1 per second
Bank Angle	Degrees	2 per second
Pitch Angle	Degrees	2 per second
Mag Heading	Degrees	1 per second
Torque L	Ft-lb	1 per second
Torque R	Ft-lb	1 per second

The gust loads data are presented as cumulative occurrences of vertical gust load factor and as cumulative occurrences of derived gust velocity. Gust load factor data are also compared with recorded data from other aircraft types and with other published data. Fig. 2 presents the cumulative occurrences of incremental vertical gust load factor per 1000 hours by pressure altitude for the combined climb, cruise, and descent phases of flight.

Figure 3 shows the difference in severity of vertical load factor for gust between a commuter aircraft, the BE-1900D, and two large transport aircraft, the B-737 and the MD-82/83 during routine commercial operations.

Figure 2

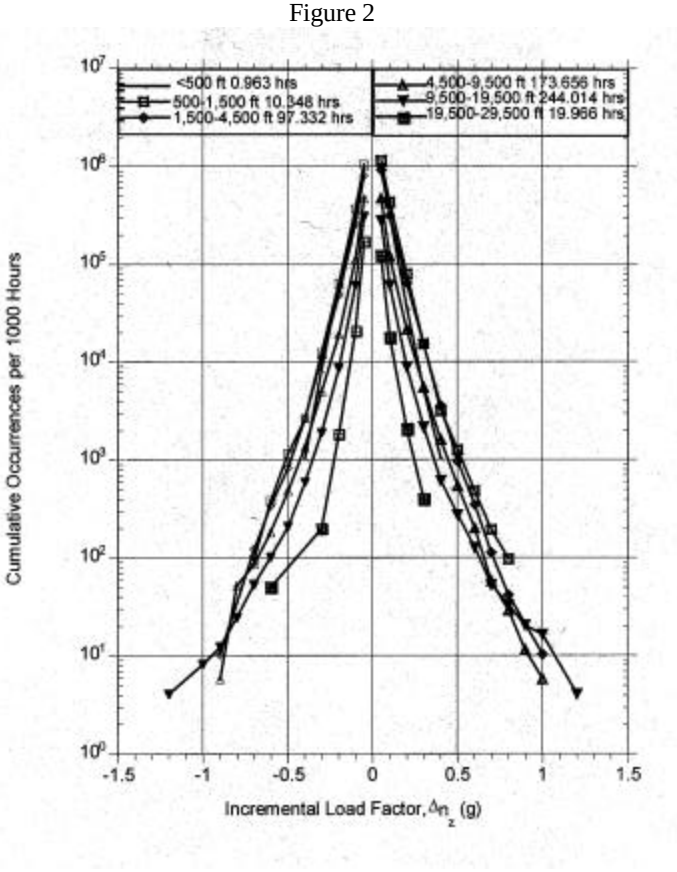


Figure 3

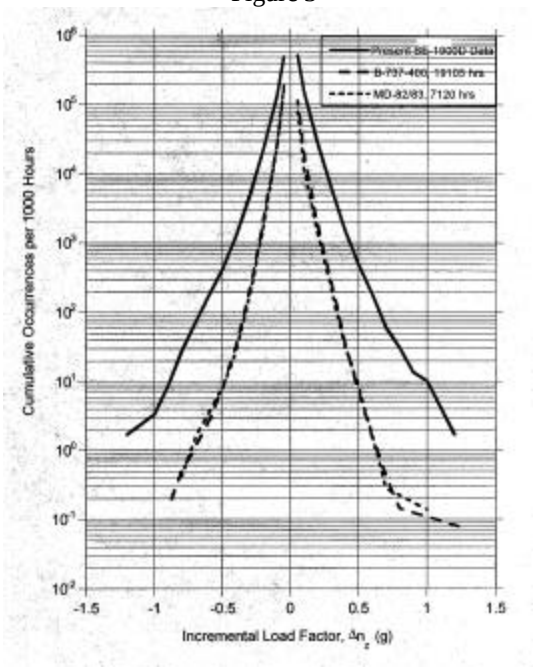
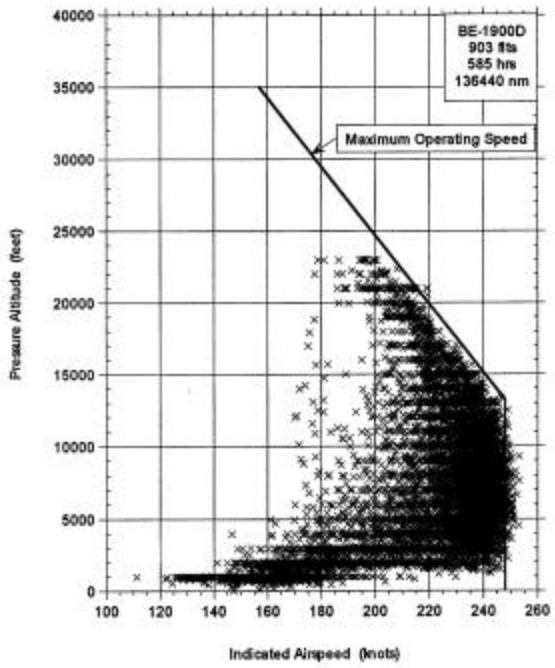


Figure 4 shows the maximum speed attained verses coincident altitude sorted by altitude band. Each data point represents the maximum airspeed attained within each 1000 foot bans of altitude; therefore, the actual point is plotted for the maximum speed and corresponding altitude where the maximum sped occurred. Also shown is the aircraft design operational airspeed line. The plot shows that this limit is occasionally being exceeded, and these exceedances usually occurred during the cruise or descent flight phases.

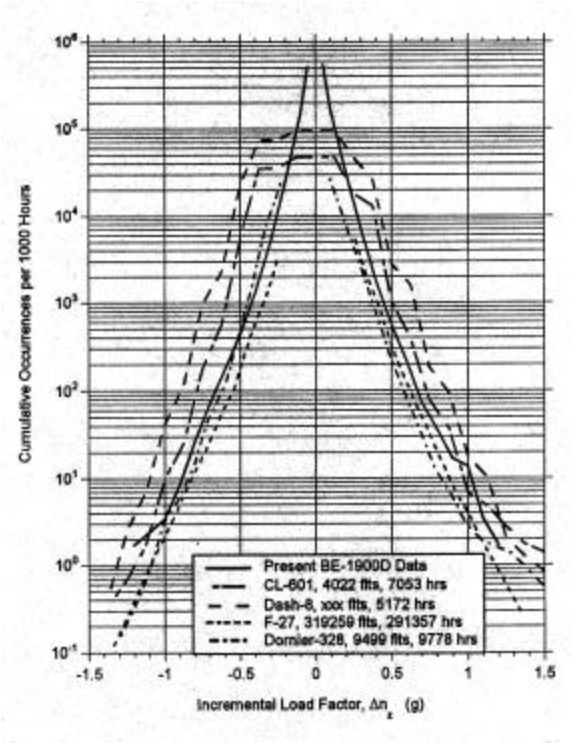
Figure 4



Comparisons of usage were made between data recorded on other commuter aircraft and other published small aircraft data. Figure 5 provides a comparison of the relative severity of vertical load factor for gust and maneuver combined between five commuter type aircraft, the BE-1900D, the Canadair Challenger CL-601 and the DeHavilland Dash-8 aircraft, the Fokker F-27, and the Fairchild/Dornier 328. It can be seen that the present spectra are most similar, and nearly identical, to the two general usage spectra as would be expected:

- Large differences in measured gust load factors between the commuter type aircraft and the large transport aircraft were found but were accounted for by the differences in the load factor response of each aircraft.
- Maximum airspeed limits at various altitudes as defined in the aircraft's Type Certificate were occasionally exceeded.
- Since derivation of derived gust velocity requires knowledge of the aircraft's gross weight, it is recommended that future data include at least the aircraft takeoff and landing weight.
- Additional instrumentation to record related parameters such as gross weight, fuel weight, lateral acceleration, and Mach number should be installed to provide more in-depth and accurate information to the user of these data.
- Additional data on turboprops needs to be collected and processed for a more reliable characterization of typical in-service usage.

Figure 5



Further details will be available in "Statistical Loads Data for BE-1900D Aircraft in Commuter Operations" to be published early in 2000. For further information, please contact **Thomas DeFiore** (AAR-433), Program Manager, Flight and Ground Loads (609) 485-5009, Fax: (609) 485-4569.

CALL FOR NOMINATIONS FOR FOURTH ANNUAL FAA EXCELLENCE IN AVIATION AWARD

The FAA has issued a call for nominations for its Excellence in Aviation Award. Through this award, the FAA formally recognizes significant accomplishments as a result of aviation related research efforts. This special distinction is intended to augment the ability of the government to recognize superior research efforts and to highlight benefits of such activities.

The Excellence in Aviation designation is a highly competitive, non-monetary award that is presented annually to individuals and/or institutions following an evaluation of documentation which clearly shows how their past research benefits the aviation community today. Nominees must be able to show significant impact and benefit of extended aviation research efforts and application of improvements within the aviation industry.

This is the fourth year that the agency will be presenting this prestigious award. Each year the nominee pool has grown, reflecting a broad spectrum of aviation-related research activities. Nominations and supporting documentation for the 2000 Excellence in Aviation Award will be accepted through May 1, 2000. For additional information on the Excellence in Aviation Award or to receive a nomination form, please contact **Denise Davis**, FAA's Office of Aviation Research, at (202) 267-9426 or by email at denise.davis@faa.gov.

Last year, the FAA selected Embry-Riddle Aeronautical University to receive the Excellence in Aviation Award for its continued contributions in aviation research and education. For more than seven decades, Embry-Riddle has supported the FAA mission and the nation's aviation goals through its applied aviation research

activities and ongoing academic programs. Working with both government and industry, the university has made valuable contributions in areas such as air traffic management, aviation human factors, pilot education and training, aircraft maintenance, and airframe design and technology.

The University of North Dakota's John D. Odegard School of Aerospace Sciences received the 1998 institutional award for its over 30 years of innovative aviation research, education and training programs. Dr. Satya N. Atluri, a professor at the University of California, Los Angeles, received the 1998 individual Excellence in Aviation award. Dr. Atluri has had a significant impact on the aviation research community through his pioneering studies on structural integrity and damage tolerance of commercial and military aircraft, the establishment of widespread fatigue damage thresholds for aircraft, residual strength of aging aircraft with wide-spread fatigue damage, and life-enhancement of aging aircraft structural components through composite patch repairs.

In 1997, the agency selected the Joint University Program (JUP) on Air Transportation Research, a consortium comprised of the Massachusetts Institute of Technology, Ohio University, and Princeton University, to receive the agency's first Excellence in Aviation Award. That year, the JUP celebrated its 25th year of research, providing both the FAA and NASA a high return on investments. The three universities are conducting cutting-edge research on a variety of aviation topics, such as intelligent flight control systems, weather hazard avoidance, satellite navigation, cockpit displays, and intelligent air traffic management.

New Infrared Deicing Center Opens

In 1994, AAR-400 built a partnership with a small Buffalo, NY, firm that had an idea for deicing airplanes that went against conventional wisdom. Process Technologies Inc. (PTI) had a total of three 3 people, a hand-held contraption that melted ice cubes in a Buffalo garage, and an enormous amount of enthusiasm and perseverance.

On February 15, 2000, PTI (now known as Radiant Energy Corp) officially opened an infrared deicing facility for Continental Airlines at Newark International Airport. This facility is large enough to deice the Continental fleet up to and including a Boeing 757.

The technology behind this innovative system is as old as the sun itself. It uses infrared energy to warm an object in the same manner as the sun warming your skin on a cold winter day. Specially designed burners to heat pipes to a point at which they emit infrared energy "tuned" to the absorption range of ice. This energy behaves like a beam of light except that it warms rather than illuminates objects in its path.

The FAA's Technology Transfer Team of **jennelle Derrickson**, **Marie Denan**, and **Pete Sparacino** put together a Cooperative Research and Development Agreement with PTI in 1994. This CRDA gave **Jim White** (AAR-411) the opportunity to comb the Tech Center for people and resources to fuse with the industrial know-how and fiscal resources gathered by PTI.

Over the next three winters Armando Gaetano (ACT-370) and test pilots Mark Ehrhart and Keith Biehl (both ACT-370) provided a mix of FAA test aircraft for a series of deicing demonstrations. Jim, Armando, and the pilots worked many frigid nights in Buffalo and Rochester, NY, with the PTI crews as they demonstrated to the aviation community the effectiveness of their

leicing system. Every step of the way he Imaging specialists from ACT-073 captured the events on film and videotape.

The Newark facility is the third nfrared system to go on-line. Buffalo claims the first system (1997) followed by Rhinelander, WI (1998). These facilities are sized for business and commuter airplanes. With Newark, infrared deicing has moved up to the big leagues. But all three provide a chemical-free method for leicing aircraft.

Although the CRDA with PTI is past history, the dividends continue. And there is one more FAA chapter o this story. George Legarreta AAS-100) is preparing the Advisory Circular language that will make systems like the one at Newark eligible for federal support. Airports across the country (and the world for hat matter) now have another way to keep winter flight safe for both the passenger and the environment.

COE Student Named Student of the Year

At the Ninth Annual Student of the Year Awards ceremony held in Washington, DC, in January, the Department of Transportation (DOT) honored the most outstanding student from participating University Transportation Centers for his/her achievements and promise for future contributions to the transportation field. Secretary Rodney Slater joined Research and Special Programs Administration (RSPA) Administrator Kelly Coyner and Deputy Secretary Mortimer Downey in presenting these prestigious awards to 29 students from various universities throughout the country.

Traditionally, all awardees have been affiliated with the DOT University Transportation Centers (UTC) program, administered by RSPA. This year, in the spirit of "One DOT," the Department for the second time has honored an awardee from the Air Transportation Centers of Excellence (COE), sponsored by the FAA. This program is managed through the Airport and Aircraft Safety Research and Development Division (AAR-400).

William D. Hall, Ph.D., was the distinguished scholar from the Massachusetts Institute of Technology, a core member of the FAA Center of Excellence for Operations Research. Bill grew up in western Michigan, where he developed a fascination for aviation from an early age. He began to experiment with model aircraft by building and flying a succession of free gliders, propeller-driven go-carts, and eventually radio-controlled aircraft. In 1986, he won the Westinghouse International Science Fair award for his homebuilt image scannr.

As an undergraduate student at MIT, Bill studied aeronautical engineering and worked on autonomous robotic vehicles at the MIT Sea Grant Laboratory. In 1992 his autonomous vehicle research culminated in a Masters degree. Bill worked at the Draper Laboratory from 1992 until 1995 on topics ranging from autonomous intelligence, simulation, and transportation system optimization. Thereafter, he enrolled in the Operations Research Center at MIT to pursue his Ph.D. in Air Traffic Management. Bill continues his work at Draper Labs leading a small Air Traffic Management group, and experiences the air transportation system first-hand as an instrument-rated pilot.

Secretary Slater encouraged the students to "have fun with your own mind. He gave "honor to those whom honor is due, not only for what you have each achieved, but for what I know you will continue to achieve." He closed by reminding the audience of over one hundred faculty, family, and DOT representatives, that "Once the mind has reached for a new idea, it can never, never return to

its former state."

The UTC program was initiated in 1987 under the Surface Transportation and Uniform Relocation Assistance Act, and authorized the establishment and operation of transportation centers in each of the 10 standard federal regions. The mission of the original 14 UTCs was to advance U.S. expertise and technology transfer.

The Transportation Equity Act for the 21st Century (TEA-21), enacted in 1998, authorized up to $194M for grants to establish and operate up to 33 UTCs throughout the country in FY 1998 - 2003. All UTCs are required to match federal funds dollar for dollar. TEA-21 established education as one of the primary objectives of a university transportation center, institutionalized the use of strategic planning in university grant management, and reinforced the program's focus on multi-modal transportation.

For additional information on the FAA Centers of Excellence Program, contact **Patricia Watts**, 609-485-5043.

New AAR Website Debuts

In early February, AAR's new and improved website went "live," with search capabilities, as well as updated information, factsheets, and Technical Reports. You can access the new site at http://research.faa/gov/aar.

Farewell from the Editor

Since this is my last issue as the editor of *Aviation Research NewsWatch* before I start a detail in the Office of Civil Aviation Plans and Policy, I wanted to thank the newsletter's readers, contributors, and supporters over the past few years. When I produced my first issue of what was then called *AAR News* in June 1996, I admit, I was a little hesitant, not exactly sure how to even begin to produce a newsletter. It has been a tremendous learning experience, sometimes fun, sometimes frustrating, but always worth the effort.

Although I am excited about taking on new and challenging duties, I must admit, it is with some regret that I leave this newsletter behind. Because of the support from my colleagues in the Office of Aviation Research, the newsletter has grown over the years into something we are all proud of. This has truly been a team effort on the part of AAR, and I cannot praise my fellow AARers enough for always making themselves available and having the extraordinary patience to explain their programs and technologies to me time and time again. I will never be able to repay this debt of kindness. I also owe special thanks to our readers, whose continued interest in AAR made this newsletter possible and my job very rewarding.